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Osamu Shinkawa

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EXAMINER

GOLDBERG, BRIAN J

ART UNIT

PAPER NUMBER

2861

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/807,920

Applicant(s)

SHINKAWA, OSAMU

Examiner

Brian Goldberg

Art Unit

2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 and 14-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 November 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **pulse generating means** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 12, and 14- 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (US 5975668) in view of Takazawa et al. (US 20020018090) and further in view of Fukano (JP 63141750).

4. Regarding claim 1, Fujii et al. disclose "a diaphragm (5 of Fig 1); an actuator which displaces the diaphragm (27 of Fig 5); a cavity filled with a liquid (6 of Fig 1), an internal pressure of the cavity being increased and decreased in response to displacement of the diaphragm (col 14 ln 54-56); and a nozzle communicated with the cavity (4 of Fig 1), through which the liquid is ejected in the form of droplets in response to the increase and decrease of the internal pressure of the cavity (col 14 ln 54-56); a driving circuit which drives the actuator of each droplet ejection head (40 of Figs 1, 6, 7A, 102 of Fig 9A, Fig 27); pulse generating means for generating reference pulses (63 of Fig 6); a counter for counting the number of reference pulses generated for a predetermined time period (91 of Fig 28)." Thus Fujii et al. meet the claimed invention except "ejection failure detecting means for detecting an ejection failure of the droplets on the basis of the count value of the counter counted for the predetermined time period" and "switching means for switching a connection of the actuator from the driving

circuit to the ejection failure detecting means after carrying out a droplet ejection operation by driving the actuator.”

5. Takazawa et al. teach “ejection failure detecting means for detecting an ejection failure of the droplets on the basis of the count value of the counter counted for the predetermined time period (741, Par [0101], Fig 5).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include ejection failure detecting means. One would have been motivated to modify Fujii et al. for the benefit of having the ability to detect and correct errors in order to achieve a more accurate and reliable printing system.

6. Fukano teaches “switching means (transistors 7 or 8) for switching a connection of the actuator from the driving circuit to the ejection failure detecting means after carrying out a droplet ejection operation by driving the actuator (immediately after ejection, transistors 7 and 8 receive a signal and are switched on, thereby connecting the actuator 9 to the detection means of Fig 1).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to provide the switching means. One would have been motivated to so modify Fujii et al. in view of Takazawa et al. for the benefit of determining whether there are bubbles in the ink chamber or whether it has run out of ink, as stated by Fukano.

7. Regarding claim 12, Fujii et al. disclose “storage means for storing the detection result detected by the ejection failure detecting means (75 of Fig 21, 92 of Fig 28).”

8. Regarding claim 14, Fukano further teaches “the ejection failure detecting means includes an oscillation circuit and the oscillation circuit oscillates in response to an

Art Unit: 2861

electric capacitance component of the actuator that varies with the residual vibration of the diaphragm (page 6 ln 17 – page 7 ln 2)."

9. Regarding claim 15, Fukano further teaches "the ejection failure detecting means includes a resistor element connected to the actuator, and the oscillation circuit forms a CR oscillation circuit based on the electric capacitance component of the actuator and a resistance component of the resistor element (page 4 ln 22-25)."

10. Regarding claim 16, Fukano further teaches "the ejection failure detecting means includes an F/V converting circuit (8, 19-21, and 3, page 7 ln 13-15) that generates a voltage waveform in response to the residual vibration of the diaphragm from a predetermined group of signals generated based on changes in an oscillation frequency of an output signal from the oscillation circuit (see Fig 4-6)."

11. Regarding claim 17, Fukano further teaches "the ejection failure detecting means includes a waveform shaping circuit (11) that shapes the voltage waveform in response to the residual vibration of the diaphragm generated by the F/V converting circuit into a predetermined waveform (page 7 ln 10-11)."

12. Regarding claim 18, Fukano further teaches "the waveform shaping circuit includes: DC component eliminating means for eliminating a direct current component from the voltage waveform of the residual vibration of the diaphragm generated by the F/V converting circuit (11, page 7 ln 11-13); and a comparator that compares the voltage waveform from which the direct current component thereof has been eliminated by the DC component eliminating means with a predetermined voltage value (page 8 ln 20-25); and wherein the comparator generates and outputs a rectangular wave based

Art Unit: 2861

on this voltage comparison (processor compares the detected timing to a normal timing to determine a malfunction, processors are digital and operate by way of rectangular waves representing digital bit data)."

13. Regarding claims 14-18, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Fujii et al. in view of Takazawa et al. and Fukano as further modified with the disclosure of Fukano in order to create a higher quality printing apparatus with a more robust and accurate ejection failure detection means that includes an oscillation circuit with a resistor, and F/V converting circuit, and a waveform shaping circuit.

14. Regarding claim 19, Fujii et al. disclose "the actuator includes an electrostatic actuator (see abstract, ln 2)."

15. Regarding claim 20, Fukano further teach "the actuator includes a piezoelectric actuator having a piezoelectric element and using a piezoelectric effect of the piezoelectric element (element 9)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to interchange the piezoelectric actuator taught by Fukano and the electrostatic actuator disclosed by Fujii et al. One would have been motivated to modify Fujii et al. for the benefit of obtaining higher accuracy or the capability of using higher voltages both of which are provided by the properties of a piezoelectric element over an electrostatic element.

16. Regarding claim 21, Fujii et al. disclose "wherein the droplet ejection apparatus includes an ink jet printer (see Fig 33)."

Art Unit: 2861

17. Claims 1, 2, 5, 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Nishihara (US 2002014450) and further in view of Fukano (JP 63141750).

18. Regarding claims 1, 2, and 5 Fujii et al. disclose "a diaphragm (5 of Fig 1); an actuator which displaces the diaphragm (27 of Fig 5); a cavity filled with a liquid (6 of Fig 1), an internal pressure of the cavity being increased and decreased in response to displacement of the diaphragm (col 14 ln 54-56); and a nozzle communicated with the cavity (4 of Fig 1), through which the liquid is ejected in the form of droplets in response to the increase and decrease of the internal pressure of the cavity (col 14 ln 54-56); a driving circuit which drives the actuator of each droplet ejection head (40 of Figs 1, 6, 7A, 102 of Fig 9A, Fig 27); pulse generating means for generating reference pulses (63 of Fig 6); a counter for counting the number of reference pulses generated for a predetermined time period (91 of Fig 28)." Thus Fujii et al. meet the claimed invention except "ejection failure detecting means for detecting an ejection failure of the droplets on the basis of the count value of the counter counted for the predetermined time period; and switching means for switching a connection of the actuator from the driving circuit to the ejection failure detecting means after carrying out a droplet ejection operation by driving the actuator" and "wherein the predetermined time period is a time period until a residual vibration of the diaphragm displaced by the actuator is generated after the droplet has been normally ejected from the droplet ejection head" and "the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally



ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period.”

19. Regarding claim 1, Nishihara teaches “ejection failure detecting means for detecting an ejection failure of the droplets on the basis of the count value of the counter counted for the predetermined time period (212, 213 of Fig 10, Par [0155], [0156]).” Regarding claim 2, Nishihara teaches “wherein the predetermined time period is a time period until a residual vibration of the diaphragm displaced by the actuator is generated after the droplet has been normally ejected from the droplet ejection head (Par [0012], [0130]).” Regarding claim 5, Nishihara teaches “the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period (Par [0155], [0156]).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include ejection failure detecting means. One would have been motivated to modify Fujii et al. for the benefit of having the ability to detect and correct errors in order to achieve a more accurate and reliable printing system.

20. Regarding claim 1, Fukano teaches “switching means (transistors 7 or 8) for switching a connection of the actuator from the driving circuit to the ejection failure detecting means after carrying out a droplet ejection operation by driving the actuator (immediately after ejection, transistors 7 and 8 receive a signal and are switched on, thereby connecting the actuator 9 to the detection means of Fig 1).” It would have been

Art Unit: 2861

obvious to one of ordinary skill in the art at the time of the applicant's invention to provide the switching means. One would have been motivated to so modify Fujii et al. in view of Nishihara for the benefit of determining whether there are bubbles in the ink chamber or whether it has run out of ink, as stated by Fukano.

21. Regarding claim 12, Fujii et al. further disclose "storage means for storing the detection result detected by the ejection failure detecting means (75 of Fig 21, 92 of Fig 28)."

22. Regarding claim 21, Fujii et al. further disclose "wherein the droplet ejection apparatus includes an ink jet printer (see Fig 33)."

23. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al. and Fukano and further in view of Fujii et al. (US 20010007460).

24. Regarding claims 2-4, Fujii et al. in view of Takazawa et al. and Fukano disclose the claimed invention as set forth above with respect to claim 1. Thus Fujii et al. in view of Takazawa et al. and Fukano meet the claimed invention except "wherein the predetermined time period is a time period until a residual vibration of the diaphragm displaced by the actuator is generated after the droplet has been normally ejected from the droplet ejection head" and "wherein the predetermined time period is a time period corresponding to a first half [or one] cycle of the residual vibration."

25. Fujii et al. teach "wherein the predetermined time period is a time period until a residual vibration of the diaphragm displaced by the actuator is generated after the droplet has been normally ejected from the droplet ejection head (Par [0107])" and

“wherein the predetermined time period is a time period corresponding to a first half [or one] cycle of the residual vibration (Par [0107]).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to have the predetermined time period be a time period until residual vibration. One would have been motivated to modify Fujii et al. in view of Takazawa et al. and Fukano for the benefit of ensuring that the printing system operates efficiently and that ink droplets can be formed stably resulting in a higher quality printer as set forth by Fujii et al. in paragraphs [0107] and [0108].”

26. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al. and Fukano and further in view of Ishinaga et al. (US 20020149657). Fujii et al. in view of Takazawa et al. and Fukano disclose the claimed invention as set forth above with respect to claim 1. Thus Fujii et al. in view of Takazawa et al. meet the claimed invention except “the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period.”

27. Ishinaga et al. teach “the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period (Par [0201] – [0203]).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include ejection failure detecting means using a comparison. One would

Art Unit: 2861

have been motivated to modify Fujii et al. in view of Takazawa et al. and Fukano for the benefit of having the ability to detect and correct errors in order to achieve a more accurate and reliable printing system.

28. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. and further in view of Kawamura (US 4577203). Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. disclose the claimed invention as set forth above with respect to claim 5. Thus Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. meet the claimed invention except "the ejection failure detecting means judges that an air bubble has been intruded into the cavity as a cause of the ejection failure in the case where the count value is smaller than the normal count range."

29. Kawamura teaches "the ejection failure detecting means judges that an air bubble has been intruded into the cavity as a cause of the ejection failure in the case where the count value is smaller than the normal count range (col 3 ln 65 – col 4 ln 8)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that an air bubble exists in the cavity as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

30. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. and further in view of Yamaguchi

Art Unit: 2861

et al. (US 5379061). Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. disclose the claimed invention as set forth above with respect to claim 5. Thus Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. meet the claimed invention except "the ejection failure detecting means judges that an air bubble has been intruded into the cavity as a cause of the ejection failure in the case where the count value is smaller than the normal count range."

31. Yamaguchi et al. teach "the ejection failure detecting means judges that an air bubble has been intruded into the cavity as a cause of the ejection failure in the case where the count value is smaller than the normal count range (col 6 ln 26-33)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that an air bubble exists in the cavity as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

32. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. and further in view of Noyes et al. (US 6364452) and Yamaguchi et al. Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. disclose the claimed invention as set forth above with respect to claim 5. Thus Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. meet the claimed invention except "the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying or that paper dust is adhering in

Art Unit: 2861

the vicinity of the outlet of the nozzle as a cause of the ejection failure in the case where the count value is larger than the normal count range.”

33. Noyes et al. teach “the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying... (col 80 ln 12-23).” Yamaguchi et al. teach “...paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure... (col 5 n 45-57).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that liquid has thickened or paper dust is adhering to the nozzle as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

34. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. and further in view of Fujii (US 6299277) and Yamaguchi et al. Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. disclose the claimed invention as set forth above with respect to claim 5. Thus Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. meet the claimed invention except “the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying or that paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure in the case where the count value is larger than the normal count range.”

35. Fujii teaches "the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying... (col 2 ln 5-27)." Yamaguchi et al. teach "...paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure... (col 5 n 45-57)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that liquid has thickened or paper dust is adhering to the nozzle as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Ishinaga et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

36. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al. and Fukano, and further in view of Nishida et al. (US 20030146742). Fujii et al. in view of Takazawa et al. and Fukano disclose the claimed invention as set forth above with respect to claim 1. Thus Fujii et al. in view of Takazawa et al. and Fukano meet the claimed invention except "the counter subtracts the number of reference pulses counted for the predetermined time period from a predetermined reference value, and the ejection failure detecting means detects the ejection failure on the basis of the subtraction result."

37. Nishida et al. teach "the counter subtracts the number of reference pulses counted for the predetermined time period from a predetermined reference value, and the ejection failure detecting means detects the ejection failure on the basis of the subtraction result (Par [0204])." It would have been obvious to one of ordinary skill in

Art Unit: 2861

the art at the time of the applicant's invention to include a subtraction capability of the counter as the basis for detecting the error. One would have been motivated to modify Fujii et al. in view of Takazawa et al. and Fukano for the benefit of creating a more robust and higher quality sensing system by using a reference as a "normal".

38. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. and further in view of Kawamura. Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. disclose the claimed invention as set forth above with respect to claim 8. Thus Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. meet the claimed invention except "the ejection failure detecting means judges that an air bubble has intruded into the cavity as a cause of the ejection failure in the case where the subtraction result is smaller than a first threshold."

39. Kawamura teaches "the ejection failure detecting means judges that an air bubble has been intruded into the cavity as a cause of the ejection failure in the case where the count value is smaller than a first threshold (col 3 ln 65 – col 4 ln 8)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that an air bubble exists in the cavity as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.



Art Unit: 2861

40. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. and further in view of Yamaguchi et al. Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. disclose the claimed invention as set forth above with respect to claim 8. Thus Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. meet the claimed invention except "the ejection failure detecting means judges that an air bubble has intruded into the cavity as a cause of the ejection failure in the case where the subtraction result is smaller than a first threshold."

41. Yamaguchi et al. teach "the ejection failure detecting means judges that an air bubble has intruded into the cavity as a cause of the ejection failure in the case where the subtraction result is smaller than a first threshold (col 6 ln 26-33)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that an air bubble exists in the cavity as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

42. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. and further in view of Noyes et al. Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. disclose the claimed invention as set forth above with respect to claim 8. Thus Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. meet the claimed invention except "the

Art Unit: 2861

ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying as a cause of the ejection failure in the case where the subtraction result is larger than a second threshold."

43. Noyes et al. teach "the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying as a cause of the ejection failure in the case where the subtraction result is larger than a second threshold (col 80 ln 12-23)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that liquid has thickened due to drying as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

44. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. and further in view of Fujii. Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. disclose the claimed invention as set forth above with respect to claim 8. Thus Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. meet the claimed invention except "the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying as a cause of the ejection failure in the case where the subtraction result is larger than a second threshold."

45. Fujii teaches "the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying as a cause of the ejection failure in the

case where the subtraction result is larger than a second threshold (col 2 ln 5-27).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that liquid has thickened due to drying as a cause of error. One would have been motivated to modify Fujii et al. in view of Takazawa et al., Fukano, and Nishida et al. for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

46. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Takazawa et al., Fukano, Nishida et al., and Noyes et al. or Fujii and further in view of Yamaguchi et al. Fujii et al. in view of Takazawa et al., Fukano, Nishida et al., and Noyes et al. or Fujii disclose the claimed invention as set forth above with respect to claim 10. Thus Fujii et al. in view of Takazawa et al., Fukano, Nishida et al., and Noyes et al. or Fujii meet the claimed invention except “the ejection failure detecting means judges that paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure in the case where the subtraction result is smaller than the second threshold and larger than a third threshold.”

47. Yamaguchi et al. teach “the ejection failure detecting means judges that paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure in the case where the subtraction result is smaller than the second threshold and larger than a third threshold (col 5 ln 45-57).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include judging that paper dust is adhering to the nozzle as a cause of error. One would have been

Art Unit: 2861

motivated to modify Fujii et al. in view of Takazawa et al., Fukano, Nishida et al., and Noyes et al. or Fujii for the benefit of determining a cause of error to be corrected in order to create a more robust and higher quality error detection system that not only detects, but also identifies an error cause.

### ***Double Patenting***

48. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

49. Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, and 40; 1 and 3; 9; 10; 11 and 12; 13 and 14; 19; 4; 13 and 14; 19; 16; 5; 42; 43; 44; 45; 46; 47; 48; and 49 respectively of copending Application No. 10/824335. Although the conflicting claims are not identical, they are not patentably distinct from each other

because all of the claim elements of the instant application are contained in the claims of the copending application as set forth above.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Response to Arguments***

50. Applicant's arguments with respect to claims 1-12 and 14- 21 have been considered but are moot in view of the new ground(s) of rejection. Regarding the objection to the drawings, the inclusion of the term "reference pulse" in figures 24, 29, and 31 does not satisfy showing a "pulse generating means" as claimed. The words "reference pulse" does not show the physical apparatus that is claimed to be generating the pulse. Therefore, the objection to the drawings remains.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Goldberg whose telephone number is 571-272-2728. The examiner can normally be reached on Monday through Friday, 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2861

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brian Goldberg  
AU 2861  
December 14, 2006



STEPHEN MEIER  
SUPERVISORY PATENT EXAMINER